REMARKS

This response is in reply to an Advisory Action mailed April 17, 2008, after a Final Office Action mailed on January 2, 2008, and follows a pre-appeal brief request, filed on May 2, 2008 and a rejection by the pre-appeal Panel on June 4, 2008. Accompanying this response is a Request for Continued Examination. Consequently, per 37 CFR §1.114 and MPEP 706.07(h), paragraph X, the appeal should be considered withdrawn. Claims 1, 3-9 and 11-16 are pending in the application, with claims 4-8 and 12-16 withdrawn from consideration. Claims 1, 3, 9 and 11 stand rejected under 35 U.S.C. §103(a). New claims 19-24 have been added. Support for claims 19-24 can be found in the examples of the specification. The Commissioner is hereby authorized to charge deposit account 02-1818 for any fees which are due and owing.

Claims 1, 3, 9 and 11 are rejected under §103(a) as being unpatentable over U.S. Patent No. 6,632,566 ("Yamada") in view of U.S. Patent No. 5,631,100 ("Yoshino.") Independent claims 1 and 9 contain parallel language requiring a cathode mixture layer that contains a cathode active material and a binder including a styrene butadiene latex adhesive (hereinafter "SBR") and a thickener. The content of the SBR in the cathode mixture layer ranges from between about 2 wt% to about 4 wt%, and the content of the thickener in the cathode mixture layer ranges between about 0.5 wt% to about 2.5 wt%. The thickener is polyacrylic acid (hereinafter "PAA") and the cathode active material is lithium iron phosphorous oxide ($LiFePO_4$) having an olivinic structure. Claims 3 and 11, which depend from claims 1 and 9 respectively, require the further limitation that the cathode mixture layer contains a carbon material as a conductive agent, wherein the carbon material ranges from about 5 wt% to about 12 wt% with respect to the total amount of cathode active material and carbon material. Newly added claims 19-24 recite a specific ratio of SBR to PAA, and specific limitations on the total amount of SBR and PAA in the cathode mixture layer.

As noted in the previous response to Office Action, dependent claims 3 and 11 require the further limitation that the cathode mixture layer contains a carbon material as a conductive agent, wherein the carbon material ranges from about 5 wt% to about 12 wt% with respect to the total amount of cathode active material and carbon material. In the Advisory Action, the Patent Office noted that it has not assessed claims 3 and 11 because they had not been incorporated into the independent claim at the time of the final office action. Applicants respectfully request that

the Examiner review these dependent claims because Applicants assert that they would be non-obvious over the combination of Yamada and Yoshino.

In Yamada the only support for adding carbon to the cathode mixture layer can be found at col. 10 lns. 11-12, where 25% weight acetylene black is added to $LiFePO_4$ with PVDF as a binder. In Yoshino, no discussion is present in the specification for including a conductive agent that is carbon in the cathode. In Example 1 of Yoshino, a cathode containing a lithium oxide and a pair of carbon agents is disclosed. However, first, that example contains PVDF as a binder with no thickener. Second, the binder is not greater than 2% weight of the cathode mixture layer (2 parts/(100+2.5+2.5+2) total parts = 1.87%). And third, the percent weight of carbon with respect to the total amount of cathode active material and carbon material is 4.76% (5 parts/105 total parts), which is outside the claimed range of 5-12%. Consequently, the combination of Yoshino and Yamada fails to disclose a cathode mixture layer containing olivinic $LiFePO_4$, 2-4% by weight SBR, 0.5-2.5% by weight PAA, and a carbon material as a conducting agent in 5-12% by weight with respect to the cathode active material and the carbon material.

Applicants has also added new dependent claims 19-24 which the Applicant views as further defining the claimed invention as compared to the prior art. Specifically, these limitations focus on specific ranges of binder that worked in the examples set forth in the Applicants' specification, as compared to ranges of SBR and PAA that failed. The Examiner's attention is directed to the Examples of the instant specification. Examples 1 and 2 make clear that cathodes succeed in only a very narrow range of binder and thickener concentrations when prepared with SBR, PAA and olivinic lithium iron phosphorous oxide. The SBR to PAA ratio must be between 0.8:1 to 4:1, and the amount of SBR and PAA present cannot be more than 6% of the weight of the cathode mixture layer, more preferably between 2.5-5% weight of the cathode mixture layer. Surprisingly, as the amount of binder is reduced to within these ranges, the cathodes of the claimed invention exhibit high strength layers with sufficient binding force. Furthermore, even when the total amount of binder is decreased, excellent cycle characteristics with improved high load discharge capacity are exhibited.

In addition, we briefly return to the discussion of units in Yoshino versus units in the claimed invention. First, Yoshino uses pbw for all its amounts. In theory, parts by weight per 100 pbw and weight % may reflect the same value. However, the units associated with these values make Yoshino's numbers quite different from the claimed invention. The claimed

invention reports the amount of both the binder and the thickener in percent weight *versus cathode mixture layer*. Yoshino reports pbw of binder versus active material, and pbw of thickener *versus* *binder*. Neither binder nor thickener is reported by Yoshino as against the total weight of the cathode mixture layer, so the values are not the same as percent weight used in the claimed invention.

Using Example 17 in Yoshino as an example, we can compare the values calculated by each. Example 17 has 100 parts "active" (Yoshino uses needle coke in Example 17), 10 parts of a SBR latex solution having 50% solids giving 5 parts solid SBR, and 100 parts of a solution of "thickener" having 1% weight solids (Yoshino uses carboxymethyl cellulose as thickener in Example 17) giving 1 part solids thickener. From these numbers, Example 17 has a total parts of solids of 106 parts. Calculating the percentages of SBR and thickener using the Sony calculation, we get 4.7% wt. SBR (5 parts/106 parts) and 0.94% wt. thickener (1 part/106 parts.) Calculating the ratios in Yoshino is different. For SBR, the units are pbw SBR per 100 pbw active, so 5 parts SBR/100 parts active is 5 pbw SBR (as compared to Sony's 4.7%.) For thickener, the units are reported as pbw thickener per 100 pbw SBR, so 1 part thickener/5 parts SBR is 20 pbw thickener. Notice how much different this is from Sony's value of 0.94%wt thickener.

Using this calculation, Table 1 can be created that shows the claimed ranges when converted to Yoshino's units. To create the table, the high and low values for SBR and PAA in claims 1 and 9 were used, and the balance of mass was assumed to be cathode active material (specifically, olivinic $LiFePO_4$).

Table 1

Claimed Range Value for SBR and PAA		Conversion of Claimed Range to the Values as Used in Yoshino	
wt% SBR	wt% PAA	pbw SBR	pbw PAA
4	0.5	4.18	12.5
2	0.5	2.05	25
4	2.5	4.28	62.5
2	2.5	2.09	125

As noted before, the range claimed by Applicants provides values of %wt PAA part of which fall outside of the ranges set forth in Yoshino when the values are properly converted to the pbw units described in Yoshino. Admittedly, part of the range falls within the area covered by Yoshino. However, Yoshino describes a thickener amount of between 2 to 60 pbw thickener per 100 pbw PAA. Applicants values when properly converted, shows a thickener range when used with PAA, SBR and olivinic $LiFePO_4$ of 12.5 -125 pbw, substantially different from Yoshino's disclosure. Furthermore, Yoshino describes the SBR as between 0.1 to 20 pbw, preferably 0.5-10 pbw. In contrast, Applicants' claimed range is much narrower for the claimed combination of SBR, PAA and olivinic $LiFePO_4$. Note also that several comparative examples in the present application, previously discussed in prior office actions by the Applicants, demonstrate areas within the preferred embodiments of Yoshino that are insufficient for SBR, PAA and olivinic $LiFePO_4$. For example, Comparative Example 1-2 has 5 wt% SBR and 1 wt % PAA. These convert to 5.3 pbw SBR per 100 pbw active material and 20 pbw PAA per 100 pbw SBR, values that are at the center of the preferred ranges in Yoshino, but are insufficient in the claimed invention.

In summary, Applicants still view claims 1 and 9 as distinctive from the combination of Yoshino and Yamada because the ranges of SBR and PAA that define the claimed invention are, in part, not covered by the combination, and in part represent a very small subset of the broad range described by Yoshino. Nonetheless, Applicants would like to bring prosecution on this matter to a conclusion, and are open to considering amendments to claims 1 and 9 that incorporate any of the dependent claims that the Examiner thinks would distinguish the claimed invention over the prior art cited previously. Specifically, an amendment incorporating claims 3 and 11 requiring carbon active material and/or the specific limitations set forth in claim 19-24 would be given serious consideration.

In view of the arguments presented above, Applicants assert that the instant claims are distinct and non-obvious over the combination of Yoshino and Yamada. In order to bring prosecution to a close, the Examiner is encouraged to contact the attorney of record in this case with possible amendments for the Applicants' consideration.

Respectfully submitted,

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